

PNM SJGS BART Analysis - Cost Analysis (Draft)

Technology: SNCR/SCR Hybrid - SJGS Unit 1

Date: 7/11/2007

Cost Item	\$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Hybrid system scope:	\$15,753,000	B&V cost development from vendor quote			
Reagent delivery system					
Wall injectors and multiple nozzle lances					
Automatic injector and lance retract system					
Flue gas temperature, NOx monitors					
Reagent storage tank					
Single layer catalyst SCR system					
Ductwork modifications					
Electrical system upgrades	\$378,000	Actual price from similarly sized unit, escalated to 2007 dollars			
Instrumentation and control system	\$279,000	Actual price from similarly sized unit, escalated to 2007 dollars			
Subtotal capital cost (CC)	\$16,410,000				
Gross Receipt Tax	\$1,015,000	(CC) X	6.2%		
Freight	\$821,000	(CC) X	5.0%		
Total purchased equipment cost (PEC)	\$18,246,000				
Direct installation costs					
Foundation & supports	\$3,649,000	(PEC) X	20.0%		
Handling & erection	\$5,474,000	(PEC) X	30.0%		
Electrical	\$2,737,000	(PEC) X	15.0%		
Piping	\$456,000	(PEC) X	2.5%		
Insulation	\$1,825,000	(PEC) X	10.0%		
Painting	\$182,000	(PEC) X	1.0%		
Demolition	\$1,825,000	(PEC) X	10.0%		
Relocation	\$912,000	(PEC) X	5.0%		
Total direct installation costs (DIC)	\$17,060,000				
Air preheater modifications	\$1,071,000	Scaled from a B&V project based unit size, using 0.7 scale factor			
Balanced draft conversion	\$13,366,000	Adjusted from a B&V balanced draft conversion project based on differences in scope			
Site preparation	\$1,000,000	Contingency for site unknowns, such as underground utilities			
Buildings	\$200,000	Contingency for general site building requirements			
Total direct costs (DC) = (PEC) + (DIC)	\$50,943,000				
Indirect Costs					
Engineering	\$3,566,000	(DC) X	7.0%		
Owner's cost	\$2,547,000	(DC) X	5.0%		
Construction management	\$5,094,000	(DC) X	10.0%		
Construction indirect	\$11,222,000	B&V labor market review			
Start-up and spare parts	\$1,528,000	(DC) X	3.0%		
Performance test	\$509,000	(DC) X	1.0%		
Contingencies	\$10,189,000	(DC) X	20.0%		
Total indirect costs (IC)	\$34,655,000				
Interest During Construction (IDC)	\$3,171,000	[(DC)+(IC)] X	7.41%	1 years (project time length X 1/2)	
Loss Generation during Outage (GEN)	\$15,667,000	5 weeks and	0.06095 \$/kWh	12 weeks required for BDC, 7 weeks major outage available	
Total Capital Investment (TCI) = (DC) + (IC) + (GEN)	\$104,436,000				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Operating labor	\$125,000	1 FTE and	124,862 \$/year	Estimated manpower level	
Maintenance labor & materials	\$1,528,000	(DC) X	3.0%		
Total fixed annual costs	\$1,653,000				
Variable annual costs					
Urea	\$1,703,000	1,089 lb/hr and	420 \$/ton	Engineering estimate	
Water	\$1,762,000	252 gpm and	15.67 \$/1,000 gal	Engineering estimate	
Catalyst replacement	\$215,000	33 m3 and	6,500 \$/m3	2 yr catalyst replacement rate	
Auxiliary power	\$32,000	70 kW and	0.06095 \$/kWh	Engineering estimate	
ID fan power	\$670,000	1,477 kW and	0.06095 \$/kWh	Engineering estimate	
Total variable annual costs	\$4,382,000				
Total direct annual costs (DAC)	\$6,035,000				
Indirect Annual Costs					
Cost for capital recovery	\$10,172,000	(TCI) X	9.74%	CRF at 7.41% interest & 20 year life	
Total indirect annual costs (IDAC)	\$10,172,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	\$16,207,000				

PNM SJGS BART Analysis - Cost Analysis (Draft)

Technology: SNCR/SCR Hybrid - SJGS Unit 2

Date: 7/11/2007

Cost Item	\$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Hybrid system scope:	\$15,753,000	B&V cost development from vendor quote			
Reagent delivery system					
Wall injectors and multiple nozzle lances					
Automatic injector and lance retract system					
Flue gas temperature, NOx monitors					
Reagent storage tank					
Single layer catalyst SCR system					
Ductwork modifications					
Electrical system upgrades	\$372,000	Actual price from similarly sized unit, escalated to 2007 dollars			
Instrumentation and control system	\$278,000	Actual price from similarly sized unit, escalated to 2007 dollars			
Subtotal capital cost (CC)	\$16,403,000				
Gross Receipt Tax	\$1,015,000	(CC) X	6.2%		
Freight	\$820,000	(CC) X	5.0%		
Total purchased equipment cost (PEC)	\$18,238,000				
Direct installation costs					
Foundation & supports	\$3,648,000	(PEC) X	20.0%		
Handling & erection	\$7,295,000	(PEC) X	40.0%		
Electrical	\$2,736,000	(PEC) X	15.0%		
Piping	\$456,000	(PEC) X	2.5%		
Insulation	\$1,824,000	(PEC) X	10.0%		
Painting	\$182,000	(PEC) X	1.0%		
Demolition	\$1,824,000	(PEC) X	10.0%		
Relocation	\$912,000	(PEC) X	5.0%		
Total direct installation costs (DIC)	\$18,877,000				
Air preheater modifications	\$1,071,000	Scaled from a B&V project based unit size, using 0.7 scale factor			
Balanced draft conversion	\$13,366,000	Adjusted from a B&V balanced draft conversion project based on differences in scope			
Site preparation	\$1,000,000	Contingency for site unknowns, such as underground utilities			
Buildings	\$200,000	Contingency for general site building requirements			
Total direct costs (DC) = (PEC) + (DIC)	\$52,752,000				
Indirect Costs					
Engineering	\$3,693,000	(DC) X	7.0%		
Owner's cost	\$2,638,000	(DC) X	5.0%		
Construction management	\$5,275,000	(DC) X	10.0%		
Construction indirect	\$13,041,000	B&V labor market review			
Start-up and spare parts	\$1,583,000	(DC) X	3.0%		
Performance test	\$528,000	(DC) X	1.0%		
Contingencies	\$10,550,000	(DC) X	20.0%		
Total indirect costs (IC)	\$37,308,000				
Interest During Construction (IDC)	\$3,337,000	[(DC)+(IC)] X	7.41%	1 years (project time length X 1/2)	
Loss Generation during Outage (GEN)	\$15,231,000	5 weeks and	0.06095 \$/kWh	12 weeks required for BDC, 7 weeks major outage available	
Total Capital Investment (TCI) = (DC) + (IC) + (GEN)	\$108,628,000				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Operating labor	\$125,000	1 FTE and	124,862 \$/year	Estimated manpower level	
Maintenance labor & materials	\$1,583,000	(DC) X	3.0%		
Total fixed annual costs	\$1,708,000				
Variable annual costs					
Urea	\$1,703,000	1,089 lb/hr and	420 \$/ton	Engineering estimate	
Water	\$1,762,000	252 gpm and	15.67 \$/1,000 gal	Engineering estimate	
Catalyst replacement	\$215,000	33 m3 and	6,500 \$/m3	2 yr catalyst replacement rate	
Auxiliary power	\$32,000	70 kW and	0.06095 \$/kWh	Engineering estimate	
ID fan power	\$670,000	1,477 kW and	0.06095 \$/kWh	Engineering estimate	
Total variable annual costs	\$4,382,000				
Total direct annual costs (DAC)	\$6,090,000				
Indirect Annual Costs					
Cost for capital recovery	\$10,580,000	(TCI) X	9.74%	CRF at 7.41% interest & 20 year life	
Total indirect annual costs (IDAC)	\$10,580,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	\$16,670,000				

PNM SJGS BART Analysis - Cost Analysis (Draft)

Technology: SNCR/SCR Hybrid - SJGS Unit 3

Date: 7/11/2007

Cost Item	\$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Hybrid system scope:	\$23,680,000	B&V cost development from vendor quote			
Reagent delivery system					
Wall injectors and multiple nozzle lances					
Automatic injector and lance retract system					
Flue gas temperature, NOx monitors					
Reagent storage tank					
Single layer catalyst SCR system					
Ductwork modifications					
Electrical system upgrades	\$484,000	Actual price from similarly sized unit, escalated to 2007 dollars			
Instrumentation and control system	\$291,000	Actual price from similarly sized unit, escalated to 2007 dollars			
Subtotal capital cost (CC)	\$24,455,000				
Gross Receipt Tax	\$1,513,000	(CC) X	6.2%		
Freight	\$1,223,000	(CC) X	5.0%		
Total purchased equipment cost (PEC)	\$27,191,000				
Direct installation costs					
Foundation & supports	\$5,438,000	(PEC) X	20.0%		
Handling & erection	\$10,876,000	(PEC) X	40.0%		
Electrical	\$4,079,000	(PEC) X	15.0%		
Piping	\$680,000	(PEC) X	2.5%		
Insulation	\$2,719,000	(PEC) X	10.0%		
Painting	\$272,000	(PEC) X	1.0%		
Demolition	\$2,719,000	(PEC) X	10.0%		
Relocation	\$1,360,000	(PEC) X	5.0%		
Total direct installation costs (DIC)	\$28,143,000				
Air preheater modifications	\$8,685,000	Based on a budgetary quote received for the project			
Balanced draft conversion	\$17,122,000	Adjusted from a B&V balanced draft conversion project based on differences in scope			
Site preparation	\$1,000,000	Contingency for site unknowns, such as underground utilities			
Buildings	\$200,000	Contingency for general site building requirements			
Total direct costs (DC) = (PEC) + (DIC)	\$82,341,000				
Indirect Costs					
Engineering	\$5,764,000	(DC) X	7.0%		
Owner's cost	\$4,117,000	(DC) X	5.0%		
Construction management	\$8,234,000	(DC) X	10.0%		
Construction indirect	\$19,442,000	B&V labor market review			
Start-up and spare parts	\$2,470,000	(DC) X	3.0%		
Performance test	\$823,000	(DC) X	1.0%		
Contingencies	\$16,468,000	(DC) X	20.0%		
Total indirect costs (IC)	\$57,318,000				
Interest During Construction (IDC)	\$5,174,000	[(DC)+(IC)] X	7.41%	1 years (project time length X 1/2)	
Loss Generation during Outage (GEN)	\$23,674,000		5 weeks and	0.06095 \$/kWh	12 weeks required for BDC, 7 weeks major outage available
Total Capital Investment (TCI) = (DC) + (IC) + (GEN)	\$168,507,000				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Operating labor	\$125,000		1 FTE and	124,862 \$/year	Estimated manpower level
Maintenance labor & materials	\$2,470,000	(DC) X	3.0%		
Total fixed annual costs	\$2,595,000				
Variable annual costs					
Urea	\$2,641,000	1,689 lb/hr and	420 \$/ton		Engineering estimate
Water	\$2,658,000	380 gpm and	15.67 \$/1,000 gal		Engineering estimate
Catalyst replacement	\$270,000	42 m3 and	6,500 \$/m3		2 yr catalyst replacement rate
Auxiliary power	\$32,000	70 kW and	0.06095 \$/kWh		Engineering estimate
ID fan power	\$997,000	2,197 kW and	0.06095 \$/kWh		Engineering estimate
Total variable annual costs	\$6,598,000				
Total direct annual costs (DAC)	\$9,193,000				
Indirect Annual Costs					
Cost for capital recovery	\$16,413,000	(TCI) X	9.74%	CRF at 7.41% interest & 20 year life	
Total indirect annual costs (IDAC)	\$16,413,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	\$25,606,000				

PNM SJGS BART Analysis - Cost Analysis (Draft)

Technology: SNCR/SCR Hybrid - SJGS Unit 4

Date: 7/11/2007

Cost Item	\$	Remarks/Cost Basis			
CAPITAL COST					
Direct Costs					
Purchased equipment costs					
Hybrid system scope:	\$23,680,000	B&V cost development from vendor quote			
Reagent delivery system					
Wall injectors and multiple nozzle lances					
Automatic injector and lance retract system					
Flue gas temperature, NOx monitors					
Reagent storage tank					
Single layer catalyst SCR system					
Ductwork modifications					
Electrical system upgrades	\$484,000	Similar scope to SCR modifications			
Instrumentation and control system	\$291,000	Similar scope to SCR modifications			
Subtotal capital cost (CC)	\$24,455,000				
Gross Receipt Tax	\$1,513,000	(CC) X	6.2%		
Freight	\$1,223,000	(CC) X	5.0%		
Total purchased equipment cost (PEC)	\$27,191,000				
Direct installation costs					
Foundation & supports	\$5,438,000	(PEC) X	20.0%		
Handling & erection	\$8,157,000	(PEC) X	30.0%		
Electrical	\$4,079,000	(PEC) X	15.0%		
Piping	\$680,000	(PEC) X	2.5%		
Insulation	\$2,719,000	(PEC) X	10.0%		
Painting	\$272,000	(PEC) X	1.0%		
Demolition	\$2,719,000	(PEC) X	10.0%		
Relocation	\$1,360,000	(PEC) X	5.0%		
Total direct installation costs (DIC)	\$25,424,000				
Air preheater modifications	\$8,685,000	Based on a budgetary quote received for the project			
Balanced draft conversion	\$17,122,000	Adjusted from a B&V balanced draft conversion project based on differences in scope			
Site preparation	\$1,000,000	Contingency for site unknowns, such as underground utilities			
Buildings	\$200,000	Contingency for general site building requirements			
Total direct costs (DC) = (PEC) + (DIC)	\$79,622,000				
Indirect Costs					
Engineering	\$5,574,000	(DC) X	7.0%		
Owner's cost	\$3,981,000	(DC) X	5.0%		
Construction management	\$7,962,000	(DC) X	10.0%		
Construction indirect	\$16,723,000	B&V labor market review			
Start-up and spare parts	\$2,389,000	(DC) X	3.0%		
Performance test	\$796,000	(DC) X	1.0%		
Contingencies	\$15,924,000	(DC) X	20.0%		
Total indirect costs (IC)	\$53,349,000				
Interest During Construction (IDC)	\$4,927,000	[(DC)+(IC)] X	7.41%	1 years (project time length X 1/2)	
Loss Generation during Outage (GEN)	\$23,674,000		5 weeks and	0.06095 \$/kWh	12 weeks required for BDC, 7 weeks major outage available
Total Capital Investment (TCI) = (DC) + (IC) + (GEN)	\$161,572,000				
ANNUAL COST					
Direct Annual Costs					
Fixed annual costs					
Operating labor	\$125,000		1 FTE and	124,862 \$/year	Estimated manpower level
Maintenance labor & materials	\$2,389,000	(DC) X	3.0%		
Total fixed annual costs	\$2,514,000				
Variable annual costs					
Urea	\$2,641,000	1,689 lb/hr and	420 \$/ton		Engineering estimate
Water	\$2,658,000	380 gpm and	15.67 \$/1,000 gal		Engineering estimate
Catalyst replacement	\$270,000	42 m3 and	6,500 \$/m3		2 yr catalyst replacement rate
Auxiliary power	\$32,000	70 kW and	0.06095 \$/kWh		Engineering estimate
ID fan power	\$997,000	2,197 kW and	0.06095 \$/kWh		Engineering estimate
Total variable annual costs	\$6,598,000				
Total direct annual costs (DAC)	\$9,112,000				
Indirect Annual Costs					
Cost for capital recovery	\$15,737,000	(TCI) X	9.74%	CRF at 7.41% interest & 20 year life	
Total indirect annual costs (IDAC)	\$15,737,000				
Total Annual Cost (TAC) = (DAC) + (IDAC)	\$24,849,000				